**Astrophysics Research And Analysis**

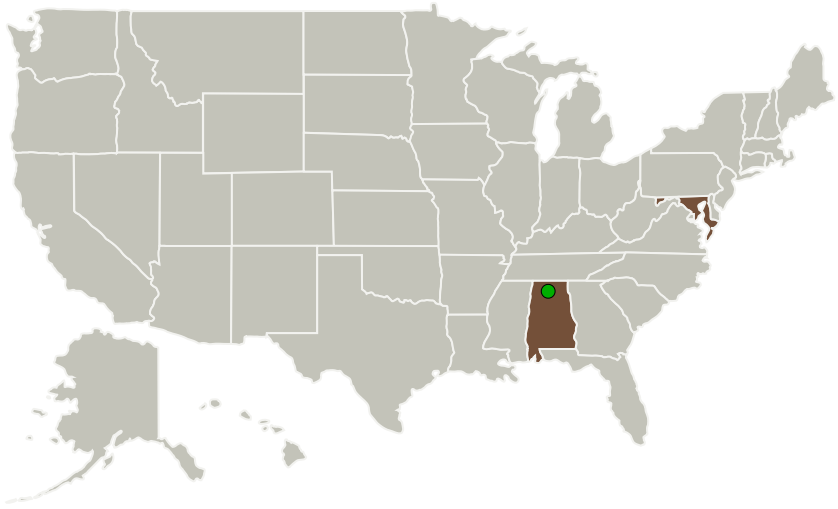
# The Development of Differential Deposition for Figure Correction in X-Ray Optics.

Completed Technology Project (2014 - 2017)

## Project Introduction

We propose the continued development of differential deposition: a physical-vapor-deposition technique for correcting residual figure errors in grazing-incidence optics. The process involves selectively depositing a filler material to smooth out the low-to-mid-spatial-frequency errors that typically dominate the performance of x-ray optics. Simulations show that given adequate metrology, substantial improvements in angular resolution are possible through application of the technique, which is applicable to both mounted and un-mounted mirrors. We have fabricated and characterized two differential deposition systems, one optimized for full shell optics and the other for segmented optics. We plan to demonstrate the full potential of the differential deposition technique for figure correction on full-shell nickel-electroformed optics fabricated at MSFC and on segmented glass optics provided by our collaborator at GSFC.

## Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| Marshall Space Flight Center(MSFC) | Supporting Organization | NASA Center | Huntsville, Alabama |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## Organizational Responsibility

**Responsible Mission Directorate:**

Science Mission Directorate (SMD)

**Responsible Program:**

Astrophysics Research and Analysis

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| Primary U.S. Work Locations | |
|---|---|
| Alabama | Maryland |

## Project Management

**Program Director:**

Michael A Garcia

**Program Manager:**

Dominic J Benford

**Principal Investigator:**

Brian D Ramsey

**Co-Investigators:**

Kiranmayee Kilaru
Jessica A Gaskin
Mikhail V Gubarev
David M Broadway
Carolyn Atkins
William W Zhang
Stephen L O'dell

## Technology Areas

**Primary:**

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.4 Manufacturing
    - TX12.4.3 Electronics and Optics Manufacturing Process

## Target Destination

Outside the Solar System